

PART I.

GROWING FOREST TREES IN WESTERN NEBRASKA.

BY W. P. SNYDER.*

INTRODUCTION.

For more than a quarter of a century farmers have been trying to grow trees in western Nebraska without surface or sub-irrigation. That the result has been a failure from a purely commercial point of view is evidenced by the lack of any groves that furnish lumber, fence posts, or enough fuel to repay the cost of production.

A few trees, however, are being grown about the buildings and in the "tree claim" plantations. These are sufficient in some localities to break the monotony of the landscape and to add much to the beauty of the country. These trees, dwarfed, scrubby, and mostly less than twenty-five feet high, are chiefly Box Elder, tho there are some Green Ash, Cottonwood, White Elm, Black Locust, Honey Locust, Mulberry, and Catalpa.

TREE CLAIM ACT.—The groves were planted because of the "Tree Claim Act" passed by Congress in 1873, but repealed in 1891. Under this law the title to a quarter-section of land could be secured by a qualified homesteader without residence on the land, by planting and cultivating for eight years ten acres of trees, 675 to the acre, on the quarter-section. This was an effort on the part of the Federal government to forest portions of the prairie land. On some "claims" there were ten acres of rather thrifty trees from four to ten feet high when "proof" was made.

* When this experiment was planned and during the first few years of its progress the United States Forest Service cooperated with the Substation, but later the Forest Service severed its connection. The Substation has received very valuable assistance from the Department of Forestry of the University of Nebraska, represented by Professor F. G. Miller, Professor Frank J. Phillips, Professor O. L. Sponsler, and Professor W. J. Duppert.

Mr. L. L. Zook, of the U. S. Department of Agriculture, took the photographs in 1912.

Professor W. J. Morrill, who is now in charge of Forestry in the University, has carefully edited the Forestry portion of this bulletin.

but on the majority of the "claims" no trees were growing, tho usually trees or seed had been planted, in compliance with the law.

The practice was to plant the trees four feet apart and to cultivate them for a few years. After the requirements of the law had been fulfilled, the trees were given little or no attention. Weeds and grass fought the trees for the scanty supply of water that was available, fire ran thru many groves, doing much injury, and cattle often completed the damage.

NATIVE FOREST TREES.—No forest trees grew on the tablelands before the advent of the settlers. There were some grow-



Fig. 1. Plowing up typical "tree claim," Substation Farm, Field 49, summer of 1905.

ing along the streams and in the canyons. Along the streams tributary to the Republican River, Cottonwood, Green Ash, American Elm, and Hackberry were common; along the Platte and Niobrara Rivers and their tributaries a few species of conifers were present also. Many of these trees were cut and used by the settlers for fence posts, buildings, and fuel. The first railroad trains that ran thru western Nebraska on the Union Pacific railroad were drawn by engines fired by native wood and ran on rails laid on native wood ties. Red Cedar fence posts

and logs were hauled from the Dismal River to the North Platte River, a distance of from 60 to 75 miles.

During the dry years of the '90's the homesteaders took the timber from the school land and from other land where the owners did not reside in the community. This enabled many people to remain who otherwise would have been compelled to return to the older settled communities. Thus the natural timber aided in the development of the region.

THE EXPERIMENT.

The North Platte Substation has undertaken to answer the question whether trees can be grown successfully without irri-



Fig. 2. Box Elder and Honey Locust on table-land, April, 1908, one year after planting.

gation on western Nebraska table-land under conditions which obtain at this Station.

LOCATION.—The North Platte Experiment Substation is located in the west central part of Nebraska, near the Platte River, in Township 13 North, Range 30 West, and lies about three miles due south of the town of North Platte.

CLIMATE.—This region is characterized by extreme and sudden variations in temperature. While most winters are open

with little snow, there are occasionally heavy snowstorms accompanied by high wind and low temperature. The temperature, at midday in the summer occasionally runs very high, but the high temperature lasts for only a few hours. The nights are invariably cool. The maximum temperature for North Platte for thirty-eight years, from 1875 to 1912, was 107° F. and the minimum —35° F. The average date of the last killing frost in



Fig. 3. Carolina Poplar (on the right) planted in 1909. Box Elder (on the left) planted in 1908. Photo October, 1912.

spring is May 1, and the average date of the first killing frost in autumn is September 29.

The average annual precipitation from 1875 to 1912 has been 18.60 inches. The average for the months of May, June, July, and August has been 13.55, or 72 per cent of the total for the year. The precipitation during the years affecting the trees growing on the Substation farm has been as follows:

Year	Precipitation	Departure from normal
	<i>Inches</i>	<i>Inches</i>
1906.....	27.99	+9.39
1907.....	19.61	+1.01
1908.....	19.96	+1.36
1909.....	22.41	+3.81
1910.....	10.70	-7.90
1911.....	17.43	-1.17
1912.....	18.69	+0.09
Average	19.54	+0.94



Fig 4. Box Elder and Honey Locust on table-land, October, 1912, six years old. Height, about 13 feet. Useful for shade and fuel.

This table shows that the trees were planted during very favorable years. The soil was prepared in 1906 for the planting

in 1907, and contained the maximum amount of water when the trees were planted both in 1907 and 1908.

AREA.—An area of about twenty-five acres is devoted to forestry purposes, and this is divided approximately as follows: (1) bench land, ten acres; (2) table-land, ten acres; (3) canyons, five acres.

ELEVATION.—The elevation of the Substation above sea level



Fig. 5. Black Locust grove on bench land. Planted 1907. Trees being killed by borers, October, 1912.

is 2,822 feet. The bench land upon which the trees are planted is approximately twenty-five feet higher, or 2,850 feet. The "table-land" is the highest land on the Substation farm and is about 175 feet higher than the "bench land." The surface of the "table-land" is generally level.

The canyons are adjacent to the table-land. The sides of these are generally steep, while the bottoms are narrow and from 25 to 50 feet below the level of the table-land.

SOIL.—The soil on the bench land is a very fine sandy loam very easy to work. The distance to water is about 50 feet. This soil is typical of that found on the benches of the Platte River valley, tho it contains no alkali.

The soil on the table-land is very similar to that on the bench land and produces good crops in seasons of sufficient



Fig. 6. Black Locust grove on table-land. Planted in 1907. Photographed October, 1912, after being destroyed by borers.

moisture. Much of the adjacent land above the river valleys is of this kind. The distance to water is about 225 feet.

The canyon bottoms have a soil which is similar to that on the "bench land," while on the sides there is little except the yellow subsoil, which, however, is of sufficient fertility to grow trees.

TREE GROWTH NATIVE TO THE REGION.—The trees which are found growing in the native stand are the Juniper (Red Cedar), Black Willow, Almond Willow, Sand-bar Willow, Cottonwood,

White Elm, Hackberry, Red Ash, Green Ash, Box Elder, and Wild Plum.

SPECIES PLANTED.

In order to determine the kind of trees that will grow best in the region, the Experiment Substation planted nearly 30



Fig. 7. Green Ash on bench land, October, 1912. Planted in 1907. Trees like this are being attacked by borers.

species in plots of about one acre each at the Substation. This planting was started in 1907. The trees are now five years old, and have been growing long enough to give an indication of what species will grow to advantage. Each kind has been tried on both bench and table-land, the number of each species varying from 200 to 1,000 or more.

The following species were planted in the spring of 1907 or that of 1908:

Green Ash
Box Elder
Hardy Catalpa
Basswood
Cottonwood
Carolina Poplar

Osage Orange
Honey Locust
Black Locust
Bur Oak
Russian Olive
Russian Golden Willow



Fig. 8. Cottonwood on bench land, October, 1912. Planted April, 1907.
Height, about 21 feet.

Norway Poplar
Black Cherry
American Elm
Hackberry
Russian Mulberry
Silver Maple

White Willow
Black Walnut
Jack Pine
Western Yellow Pine*
Scotch Pine
Black Hills Spruce†

* The same as Bull Pine.

† The same as White Spruce (*Picea canadensis*).

Colorado Blue Spruce
Norway Spruce
Douglas Fir

Austrian Pine
Norway Pine

PREPARATION OF LAND.—The planting began April 22, 1907. The land for this planting was broken during the summer of 1906 and given thoro tillage. It was plowed in the fall about eight inches deep. In the following spring it was disked thoroly, harrowed, and marked for planting. All the cultivated land planted has been prepared in a similar manner, in order to have the soil moist and in the best possible condition at the time of planting. No preparation was given to the soil in the canyon tract, excepting to break a furrow for setting some plats of trees. The methods of planting were probably somewhat more careful than would be used ordinarily by a farmer.

THE STOCK.—The trees ordered were of the best quality that could be produced, tho they often arrived in very poor condition. Some had been damaged by being kept too warm after being dug the fall previous and others had become too dry while being shipped. Of the common deciduous species, one-year-old seedlings were planted except cottonwood and the poplars, which were one-year-old rooted cuttings. We endeavored to avoid getting stock pulled from swamp land or river islands. Of the conifers three-year-old transplants were used.

MANNER OF PLANTING.—Two methods of planting were followed, the "slit" method and the "hole" method. The former method consists of making a slit in the soil with a spade, sticking the roots of the tree into the slit and pressing the soil firmly about the roots with the spade. The latter method consists of digging a hole with the spade, setting the tree, and packing the soil about the roots with the hands and feet. In some instances where it had not been possible to summer-till the land and the soil was dry, water was poured into the holes before the trees were planted. The trees were carried either in a bucket of mud and water, or wrapped in a wet burlap sack. The tree was taken from the bucket or sack and set into the soil quickly so that the roots could not become dry. Great care was taken to have trees set a few inches deeper than they were in the nursery and to pack the soil firmly about the roots.

STAND SECURED.—The percentage of trees that lived during the first season after planting depended on the variety of the trees, the condition of the trees when planted, the condition of the soil, and the weather during and following the planting. Some varieties are much more likely to grow as they are not so

easily injured in storage and in shipment or by wind and drouth after being planted. The Catalpa, Box Elder, and poplars are probably the most hardy in these respects, and the conifers the least hardy. If a fair stand is to be secured, it is quite necessary that the trees be planted in moist soil. It is a great advantage to plant after a snow or rain when the top soil is saturated with water. It is well also to plant during cloudy, moist weather rather than during clear, windy weather. The stand of trees has ranged from nearly 100 per cent to almost nothing. The conditions mentioned above were the factors governing the percentage of stand. In some shipments, we received fresh cuttings in place of the rooted cuttings which we had ordered. We planted these, but in only one instance did we secure a fair stand. Usually none of the cuttings grew.

TABLE 1.—*Species of trees planted April 22, 1907, the number of each kind, and the percentage living in the fall following.*

Species	Number planted	Percentage of stand, August 27, 1908
Russian Mulberry	503	99.2
Hardy Catalpa	1380	95.6
Box Elder	308	92.8
Silver Maple	343	87.8
Green Ash	1628	84.5
Honey Locust	2187	83.2
Black Locust	1324	81.2
American Elm	297	78.5
Cottonwood*.	983	40.3
Western Yellow Pine	914	Failure
Jack Pine	913	Failure

* Low percentage due to poor condition of trees when planted.

TABLE 2.—*Species and number of each planted on tilled land, in the spring of 1908, with the percentage of stand in the fall following.*

BENCH LAND.

Species	Number planted	Percentage of stand, fall 1908
Black Walnut	60	95
Box Elder.....	604	92
Russian Mulberry ..	60	91
Hackberry	240	75
Black Cherry	60	50
Norway Poplar*.....	348	36
American Elm†.....	514	25
Osage Orange	348	19
Russian Olive	372	12
Austrian Pine	304	Failure
Norway Spruce.....	120	Failure
Colorado Blue Spruce.....	120	Failure
Scotch Pine	304	Failure
Basswood	60	Failure
Carolina Poplar*.....	240	Failure

* Failure of Carolina Poplar and the low percentage of Norway Poplar are due to the stock of both varieties being fresh cuttings when planted.

† Low percentage of American Elm due to poor condition of trees when planted.

CULTIVATION.

The trees have been given clean tillage. This has required the use of a one-horse cultivator and occasionally the hoe. Some groups of trees now shade the ground so thoroly after they are clothed in their summer foliage that no cultivation is required during the latter part of the summer. We see need of continuing the cultivation only when it is necessary to keep grass or weeds from growing

PRUNING.

We have pruned the trees each spring to prevent the formation of forks that would later result in splitting the main trunk of the tree, and to eliminate side branches that interfered with cultivation. Some catalpas have been cut back to the ground. The new shoots from these, in most cases, have frozen back during the first winter after their growth.

SPACING AND MIXTURES.

Neither the planting of trees different distances apart nor planting different species together has given any very decided

results yet. In a few plats, the trees have made more growth where they were planted farther apart.

INJURIES.

Pocket gophers cut off about twenty-five per cent of the Silver Maple, during the first winter after they were planted. They cut off also nearly all the Honey Locust in one plat and repeated the operation for one or two years after the plat had been replanted. This plat adjoined prairie land on two sides. The gophers destroyed only a very few trees of other varieties.

Cottontail rabbits nibbled the bark off nearly all the Honey Locust trees in one plat and a few in other plats. This was during the first winter after the trees were planted. A tree badly barked usually sprouted at the surface of the ground and sent up a straight shoot more valuable than the original tree, and therefore little, if any, real damage resulted. If the rabbits had continued their work during succeeding winters they would, no doubt, have accomplished considerable damage.

BORERS.—The borers have killed nearly all the Black Locust on the table-land and have injured all on the bench land to such an extent that they have no value. Many of the Black Locust trees are entirely dead, but some still send up sprouts from the roots. During 1912 we found many Green Ash affected by borers. We presume the borers will accomplish the same results with the Ash as they have with the Black Locust, especially if their growth is checked by drouth. We found a few Honey Locust trees in which borers were working, but each of these trees gave evidence of being in a weak, sickly condition, which probably antedated the insect attack. (See figures 5 and 6.)

WINTERKILLING.—The effects of winter drouth and winter freezing are so closely connected that no attempt to differentiate the two was made. The Osage Orange froze to the ground and nearly all were killed during the first winter. The Russian Mulberry was killed on the bench land, but only froze back slightly on the table-land. The Silver Maple and Catalpa freeze back some each winter with little or no injury.

SPECIES MOST PROMISING.

The following table gives the names of the species of deciduous trees that give the most promise on the Substation farm:

TABLE 3.—*Most promising deciduous trees on Substation farm.*

Species	Percentage living	Years since planted	Height in feet
Cottonwood*.....	40	6	20-28
Carolina Poplar†	87	4	16-20
Norway Poplar†...	45	4	16-20
Box Elder	85	5	10-13
Honey Locust	92	6	8-12
Hackberry	63	5	8-12
American Elm.....	66	5	8-12
Russian Olive .. .	20	5	8-12
Black Walnut	75	5	5- 6

* The percentage living as given in this table indicates only the condition of the stock when planted and the difficulty of getting the trees to grow. Very few trees of these varieties have died after they had been planted one year.

† Carolina Poplar one-year-old rooted cuttings planted in 1909. Norway Poplar fresh cuttings planted in 1908. Conditions influencing the growth not identical. There is no intention here to state whether the Carolina Poplar and Norway Poplar are the same kind of tree.



Fig. 9. American Elm on bench land, October, 1912. Planted in 1908.

The purpose for which the trees are being planted and the location should determine which of these species should be planted. There is a popular belief that the Cottonwood, Carolina Poplar, Norway Poplar, and other similar trees will not live long on the table-land. This opinion is probably correct. It is also reported that the Carolina Poplar is more subject to injury by borers than the Cottonwood. It is the writer's opinion that neither tree will be injured by borers where the conditions permit of a vigorous growth. It is noticeable that when a tree has become weakened by insufficient moisture or from any other cause, its enemies combine to hasten its death. It may be advisable to plant some of these trees on the table-land on account of their rapid growth, with a view of replacing them later by slower growing and hardier trees.



Fig. 10. Hackberry on bench land, October, 1912. Planted in 1908
Height, about 13 feet.

The Russian Olive is of use as an ornamental tree or for a windbreak. It is slow growing and of no use for timber, but is very hardy.

The American Elm trees grow very unevenly. In a group of these trees six years old many are only three or four feet high while others are from twelve to fifteen feet high. Altho some of this species will be unsatisfactory, the good specimens



Fig. 11. Russian Olive on bench land, October, 1912. Planted in 1908.

are so very promising that we feel fully justified in recommending the American Elm rather highly.

The Box Elder should always be given a place. It is hardy and furnishes more green spots on the table-land than any other species. It will furnish shade and protection, and improve the appearance of the landscape more quickly, and probably more effectively, than any other tree on the table-land.

The Honey Locust and Hackberry give promise of being most useful for fence posts and for windbreaks about the farm.

SPECIES LEAST PROMISING.

The following table gives a list of the trees which we are trying but consider unsatisfactory:



Fig. 12. Honey Locust grove on bench land, October, 1912. Planted in 1907. Height, about 10 feet.

TABLE 4.—*Trees that are very unsatisfactory for planting in this region.*

Black Locust; killed by borers.

Catalpa; killed back during winter but sprout.

Osage Orange; killed by freezing.

Russian Mulberry; winterkills or grows scrubby.

Green Ash; injured by borers.

Russian Golden Willow; dies after a few years, probably from drouth.

Our experience indicates that the trees in the above list should be planted only on an experimental scale, if at all, under conditions similar to those prevailing here. The Black Locust is the most promising of any until the borers attack it, but these

insects have completely destroyed the Black Locust groves in this locality. Ash resisted the borers for a longer time but are now being attacked to an extent that indicates this species will be either killed outright or badly injured. We have taken every precaution possible to secure the true hardy catalpas, but we have not found them hardy here. Some of them, after many years, may make a fence post, but they freeze back so much and are so scrubby that they do not seem to be worth planting. We are dealing only with conditions as they have existed on this farm since the spring of 1907, and are not indicating what these trees may do on irrigated land or in other localities.

The species not included in either Table 3 or Table 4 are giving poor results or have not been tried sufficiently for us to judge now of their merit.

CONIFERS.

With one exception our results with the conifers, or evergreens, have been quite discouraging. Altho we purchased the best stock obtainable and have given it good care, after planting several thousand trees only a few are alive.

The best results were with fifty Black Hills Spruce which were set out in 1908. These were 18 inches high, three or four times transplanted, and shipped with a ball of earth on each tree. Nearly every one is living and making a fair growth. The next best results have been with three-year-old transplants of the Western Yellow Pine, often called Bull Pine, and with Jack Pine, both being planted in the canyons, where on the heavily grassed, northern slopes the best results were obtained. Planting in furrows seems to be better than planting without the furrows. Canyon planting, however, does not appear encouraging. The trees planted in the canyon in 1908 were killed by fire in 1910. The space was replanted the following spring, but not with as good results. It is probable that the heavy growth of grass on the ground at the time of the first planting furnished beneficial protection from the wind and sun. Since the later results with conifers at Halsey, Nebraska, by the Forest Service are much more encouraging than their earlier results, it is possible that with improved methods at this Substation we shall later be able to speak more highly of conifers for this locality.

Where we set conifer trees on cultivated land there has been almost complete failure, altho a few Jack Pine and Western Yellow Pine trees survived, and are growing well. Western Yellow Pine are growing faster than the Jack Pine. It is probable that in order to grow conifers on the tilled land the stock

should have been transplanted two or three times and be in the most vigorous condition. They should also be protected in some manner from the sun and wind after being planted until they are well established. Two barrel-staves or pieces of boards driven into the ground to form a V-shaped protection on the south and west have been found advisable at other Stations. Nearly all of the conifers planted at this Station died before they were well established and the great majority before they had started to grow after being transplanted.



Fig. 13. Planting Jack Pine and Bull Pine in the canyons.

SUGGESTIONS TO PERSONS PLANTING TREES.

SPECIES.—Be careful to plant only those species that are likely to do well. This may be determined by observing the trials already made in your locality and by consulting the State and Federal organizations. Tree agents frequently do not know your conditions and the extreme difficulty of growing trees on western Nebraska table-land. This makes their advice unreliable regarding hardy species and varieties.

STOCK.—Order only the best stock obtainable and reject any shipment that does not arrive in good condition. Have the

trees shipped so that they will arrive only a few days before you expect to plant them. Do not accept shipments in the fall. The nurserymen should be able to give the trees better care during the winter than you can give. Of the cottonwoods and poplars, use one-year-old rooted cuttings. These are cuttings grown under favorable conditions one year. Of the common broad-leaved or deciduous trees use one-year-old seedlings. Of the evergreens it is probably best to use three-year-old transplants. The foliage of these trees should be green, and the root system well developed.

CARE OF THE STOCK.—Upon receiving the trees, they should be unpacked and immediately placed in damp soil. It is well to use plenty of water and it is very important to pack the soil firmly about the roots. If convenient, it is an advantage to have the trees under a roof where they will be protected from the sun and the wind. With the evergreens care should be taken to permit the air to circulate freely thru the tops. It will not do to pack a great number of these together. Care must be taken never to allow the roots to be exposed to the sun or the air.

PLANTING.—Plant the trees only in moist soil. Choose a cloudy or rainy day when the surface of the soil is wet. Plant the trees deeper than they were in the nursery. Pack the soil firmly about the roots; it cannot be packed too firmly. If a tree is set so loosely that it can be pulled out easily by one's hand, pull it out and reset it more firmly. Carry the trees in a bucket of muddy water, or puddle the roots in mud slime and carry the trees wrapped in a wet sack. Take the trees from the bucket or sack and place them in the soil instantly. Leave two or three inches of the top soil loose after the soil about the roots has been packed firmly. It is quite essential that the evergreens be protected from the sun and wind in order to get a fair stand.

CULTIVATION.—For several years give the trees the same cultivation that you give a cornfield when you are cultivating it as you should. Young trees are not likely to grow satisfactorily when they have to compete with weeds and grass for moisture. Thoro cultivation with a loose surface mulch at all times furnishes the most favorable conditions for the growth of trees or other crops.

PART II.

SHRUBS AND ORNAMENTALS.

Nothing adds more to the pleasure and attractiveness of farm life than the farm home, of which the lawn, trees, shrubs, and flowers are important adjuncts. A farm home may be made beautiful with delightful surroundings as advantageously as a city home. To make a lawn beautiful costs in time and in money, but the investment pays well in satisfaction.

With the climatic conditions prevailing at the Substation it seems unwise to try to grow trees, shrubs, or flowers about the house unless some form of irrigation can be provided. No grass will make a green lawn under these conditions without a considerable amount of water. The lawn should be quite small unless there is an ample supply of water. Blue-grass and white clover make the best mixture for a lawn, but they will not grow well during seasons of only normal rainfall, unless irrigated.

Some trees should be planted about the buildings. It is well to confine the list to native species. The only exception to this would be to plant the Honey Locust and a few Russian Olive for ornamental purposes, and evergreens for ornament and wind-breaks. For quickly growing trees, plant the Cottonwood and Box Elder. For more permanent trees, it is probable that the American Elm, Honey Locust, Hackberry, and Black Walnut are the best. From the evergreens we would choose the Black Hills Spruce, the Western Yellow Pine, and the Jack Pine. There are other species of evergreens, possibly, as suitable as the three mentioned. The Red Cedar is the host of the "cedar apple," which is injurious to certain varieties of apple trees and should not be planted near an apple orchard. It is much better to plant a few good trees and to care for them well than to plant a large number and not properly tend them. The trees should have water where possible. This can generally be furnished from a windmill and well. Where this is impossible the soil about them should be kept cultivated with a spade, making a circle from 4 to 8 feet in diameter. Mulching may also be advisable, as it conserves the water that is present and takes the place of cultivation. It does, however, encourage surface roots which are kept down by frequent cultivation. Mulching is not practical on a well-kept lawn, as the litter will be scattered with the wind and will be unsightly.

There are several shrubs that give satisfactory results if grown on tilled land or given sufficient water. Among these are the Tamarisk, Spiraea Van Houttei, several kinds of Honeysuckles, Snowball, Common and Persian Lilac (the latter being specially desirable), Mock Orange, Golden Elder, Cut Leaf Sumac, Flowering Almond, Siberian Pea Tree, the native Flowering Currant, and Thunberg Berberry.

The Peony has given such a wealth of bloom that it should be especially mentioned. Figure 14 shows a bed of Peonies in the foreground as they appeared in 1912. These were mulched in the winter and watered in summer.

A few of the flowers which give the most satisfactory results for the labor expended are the Pansy, Tulip, Peony, Dahlia, Phlox, and Gladiolus.



Fig. 14. Peonies at the North Platte Substation.

The Pansy does well when planted along the north side of the house. It will usually live thru the winter if mulched with leaves or straw.

The Tulip will live in the ground for several years with good results if watered and mulched during the winter. Many dig the Tulip bulbs after the stalks have died down and keep them in the cellar until fall and then plant them again or throw them away and purchase new bulbs. However, we have had better results by letting the bulbs stay in the soil year after year.



Fig. 15. A flower garden in the Sand Hills.



Fig. 16. A farm home in western Nebraska.

Peonies can be kept in the ground for several years and made to bloom profusely if watered during summer and mulched during the winter.

Dahlias are easily grown. The bulbs must be dug up before freezing weather and handled like potatoes.

Phlox remains in ground during the winter.

The Gladiolus bulbs should be dug in the fall and kept in a dry place during the winter.

There are many annual flowers that do well when properly cared for, but none are likely to give as much pleasure to the grower as the plants mentioned above.

THE FARM GARDEN.—To make the farm home complete there must be a garden. The garden will likely be a source of disappointment unless it is near the house, is small, well fenced, protected from the wind, and subject to irrigation from the windmill or elsewhere. Given these conditions, the farmer's wife will have a garden that will repay its cost many times. And with the lawn, the trees, the shrubs, the flowers, the garden and a comfortable house, the farm home becomes much more attractive than the city home of the same cost.

FRUIT TREES AND SMALL FRUITS.

Fruit trees are being grown on both the bench and the table-land without irrigation. Several varieties of apple, cherry, and plum trees have been planted. A few of the apple trees planted in 1907 bore some fruit in 1912. Plums planted in 1907 bore fruit profusely in 1912, plums planted in 1909 on table-land bore a fair growth on both sites, but we have not sufficient evidence to permit us to make conclusive statements. It seems that the growing of apple trees without irrigation will prove quite discouraging, as the trees do not grow thriftily or vigorously and an injury of any sort is likely to prove fatal. On the other hand, we believe that the growing of cherries and plums will probably give satisfactory results.

We have not done much with small fruits, but currants and gooseberries are worthy of careful trials. Under expert management blackberries, raspberries, and grapes may be grown, raspberries being the most promising. Windbreaks are quite essential for growing fruit of this sort. Strawberries do well when irrigated, and rhubarb and asparagus grow with almost no care.